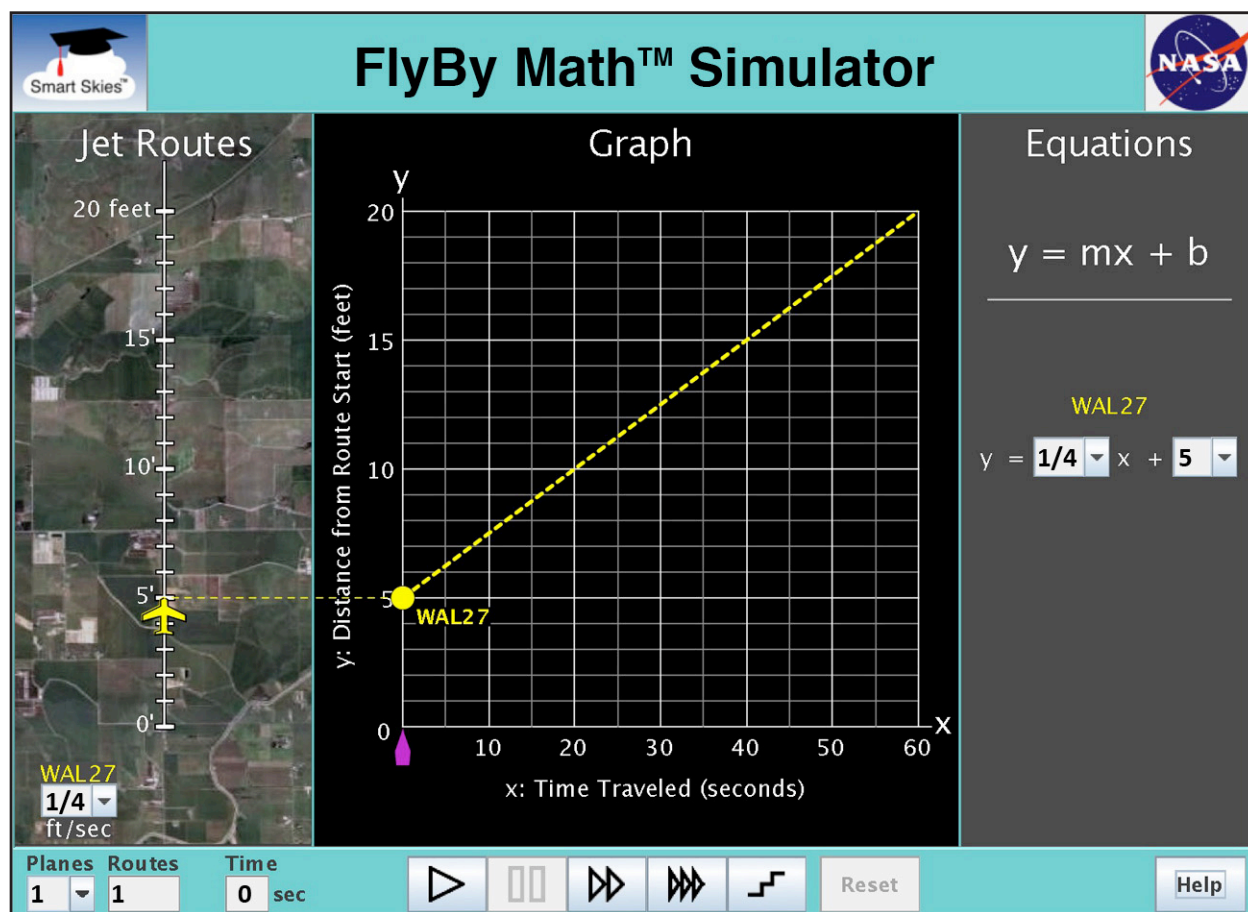


Student Worksheet B

Analyzing the Starting Position of One Plane

In this worksheet, you will work with 1 plane and 1 jet route.

- The jet route is 20 feet long.
- The plane's **STARTING POSITION** is its location on the jet route at time zero.
- Since we are interested in a plane's **starting** position, we will work mainly at time zero without running the simulator.



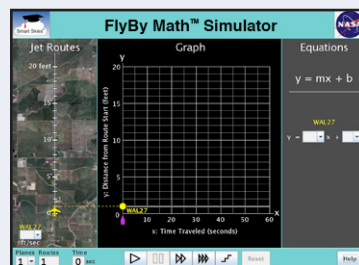
You will use the simulator to learn:

- How to find a plane's starting position using the **Jet Route Panel**, the **Graph Panel**, and the **Equation Panel**.

Exploring the Simulator

Problem 1: Set up the simulator

- Time slider: 0 seconds
- 1 plane, 1 route
- WAL27 starting position: Choose any position from 1 ft to 10 ft.
- WAL27 speed: Choose any speed greater than 0 ft/sec.



- (a) In the **Jet Route Panel**, slowly drag the plane forward and backward along its route. In the **Graph Panel**, how does the graph change as you drag the plane?



☒ The line slides up or down.

☐ The line rotates.



- (b) In the **Jet Route Panel**, slowly drag the plane forward and backward along its route. In the **Equation Panel**, how does the equation change as you drag the plane?

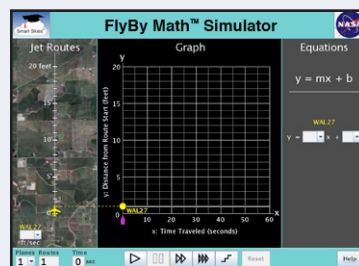


☐ The value of m (the slope) changes.

☒ The value of b (the y-intercept) changes.

Problem 2: Set up the simulator

- Time slider: 0 seconds
- 1 plane, 1 route
- WAL27 starting position: Choose any position from 1 ft to 10 ft.
- WAL27 speed: Choose any speed greater than 0 ft/sec.



- (a) In the **Jet Route Panel**, what WAL27 starting position did you choose? _____ ft

Any integer between 1 and 10, inclusive, is correct.



- (b) In the **Graph Panel**, at $x = 0$ seconds, what is the **y-coordinate** of the dot (•) on the WAL27 line?

$(x, y) = (0 \text{ seconds}, \text{_____ ft})$

The answer is the same as Problem 2a.

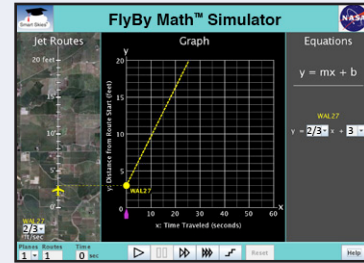


- (c) In the **Equation Panel**, what is the value of b (the y-intercept) for the WAL27 equation?

$b = \text{_____ ft}$ The answer is the same as Problem 2a.

Problem 3: Set up the simulator

- Time slider: 0 seconds
- 1 plane, 1 route
- WAL27 speed: $\frac{2}{3}$ ft/sec
- On the jet route, drag the WAL27 plane to this starting position: 3 ft.



- (a) In the **Graph Panel**, at time zero, what is the **y-coordinate** of the dot on the graph?

$$(x, y) = (0 \text{ seconds}, \underline{3} \text{ ft})$$



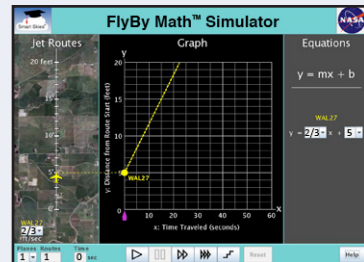
- (b) In the **Equation Panel**, look at the WAL27 equation.
Fill in the missing value in the WAL27 equation below.

$$y = \frac{2}{3}x + \underline{3}$$

Problem 4: Set up the simulator

- Time slider: 0 seconds
- 1 plane, 1 route
- WAL27 speed: $\frac{2}{3}$ ft/sec
- On the graph, drag the dot on the y-axis to the point (0, 5).

Note: The y-axis is the vertical (\updownarrow) axis.



- (a) In the **Jet Route Panel**, what is the WAL27 **starting position**? 5 ft



- (b) In the **Equation Panel**, look at the WAL27 equation.
Circle the **number** below that represents the WAL27 starting position.

$$y = \frac{2}{3}x + \textcircled{5}$$

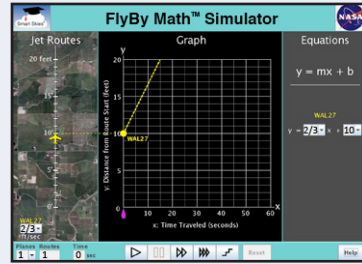


- (c) In the **Equation Panel**, the equation $y = \frac{2}{3}x + 5$ is in *slope-intercept form*, $y = mx + b$.
Circle the **letter** below that represents the WAL27 starting position.

$$y = mx + \textcircled{b}$$

Problem 5: Set up the simulator

- Time slider: 0 seconds
- 1 plane, 1 route
- WAL27 speed: $\frac{2}{3}$ ft/sec
- Enter the WAL27 equation: $y = \frac{2}{3}x + 10$



(a) In the **Jet Route Panel**, what is the WAL27 **starting position**? 10 ft



(b) In the **Graph Panel**, at time zero, what are the **coordinates** of the dot on the y-axis?

(x , y) = (0 seconds , 10 ft)

Summarizing Starting Position

Problem 6:

SUMMARIZE: Circle *all* the ways you can use the simulator to change a plane's **starting position** at time zero.

In the Jet Route Panel	In the Graph Panel	In the Equation Panel
<div>Drag the plane on its jet route.</div> <div>Change the plane speed.</div>	<div>Drag the dot on the y-axis up or down.</div> <div>Rotate the line.</div>	<div>Change the value of m.</div> <div>Change the value of b.</div>

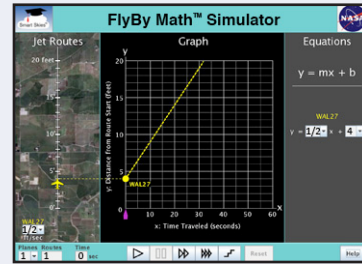
Problem 7:

SUMMARIZE: Check the box for *each* quantity that is **always the same** as the WAL27 starting position.

- ☐ The value of m (the slope) in the WAL27 equation.
- ☒ The value of b (the y-intercept) in the WAL27 equation.
- ☐ The x-coordinate (first coordinate) of the point where the WAL27 line meets the y-axis (the vertical axis).
- ☒ The y-coordinate (second coordinate) of the point where the WAL27 line meets the y-axis (the vertical axis).

Problem 8: Set up the simulator

- Time slider: 0 seconds
- 1 plane, 1 route
- WAL27 speed: $\frac{1}{2}$ ft/sec
- WAL27 starting position: 4 ft



GO BEYOND: You have just studied a plane's **starting position**. Now let's run a problem and look at a plane's **ending position**.



- (a) Click Play (\triangleright) to run the simulator until it stops. *Note: the simulator will stop at 32 seconds.* In the **Jet Route Panel**, where is WAL27 when the simulator stops? That is, what is the WAL27 **ending position**? 20 ft

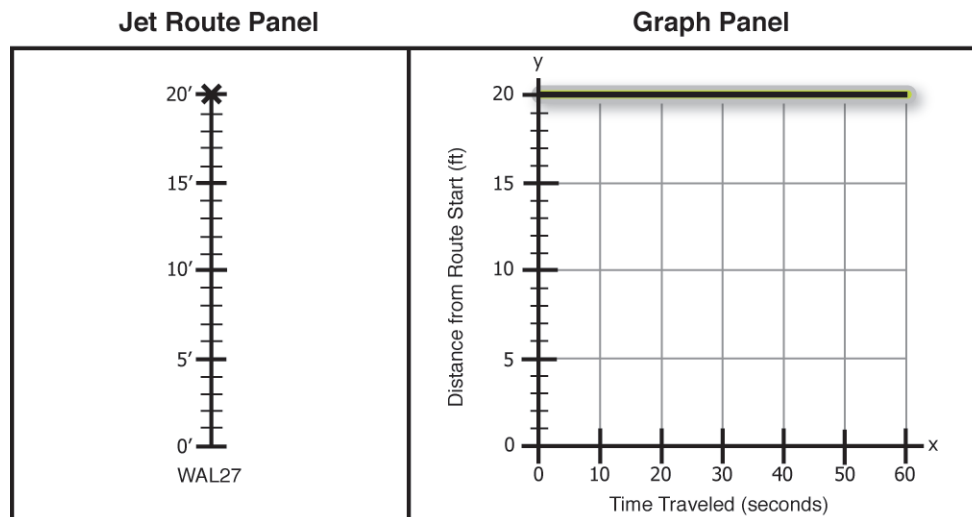


- (b) In the **Graph Panel**, when the simulator stops, what is the **y-coordinate** (second coordinate) of the dot (•) on the WAL27 line?

$$(x, y) = (32 \text{ seconds}, \underline{20} \text{ ft})$$



- (c) In the **Graph Panel** below, find the highlighted horizontal line at the top of the grid.



Each point on that horizontal line has y-coordinate 20 feet.

When the dot is anywhere on the horizontal line at 20 feet, where is the plane on its jet route?

- ☐ The plane is at the start of its jet route.
- ☒ The plane is at the end of its jet route.
- ☐ Cannot determine the location of the plane on its jet route.